

**Yi Ding:** We need to control another computer, right?

**Doctor Johnson:** Hari, this computer, I'm pretty sure is in the lab since it has the ARTES software they can see on the upper left. That's the one for talking to the Kocos test said. It's probably the computer that's next to the test side. Mike had said that there was only one of the computers that he saw in there that even had windows ten on it.

**Hari Challa:** The computer I was working on. I don't think it had windows ten, doctor Johnson, and I think we have to connect these computers together. I don't know which one has been used to set up.

**Yifan Zhu:** So, is that window seven? Because I have an old computer whose system is windows seven.

**Hari Challa:** The computer that I have has attacks often installed and it can like log into the devices. So, this is definitely not the one that is on the rug.

**Doctor Johnson:** On the rug.

**Hari Challa:** I mean, the I would have to recheck with the Greg.

**Doctor Johnson:** Talk to Ray or Mike.

**Hari Challa:** Sure. I will.

**Doctor Johnson:** The problem with the computer that's not running windows ten is none of the ITS' s men knowing connect that to the outside internet. Until we may need to look at some of their, some of the procedures for making and people out. If there's things that require administrator password, we're gonna have to find a work around on those.

**Yifan Zhu:** Doctor Johnson, would you mind showing us the lab because of we want to know what's the equipment the lab has.

**Doctor Johnson:** I'm not actually in the lab right now. I might be able to take my computer down there and connect down there. Just the show. But that's also part of what I would see that you'd be working toward doing with Hari and Abdallah.

**Yifan Zhu:** So here are, the things for us, the difficulty now is we don't have we don't know the equipment or what kind of hardware you have in the lab. So, we can't do the design or do the lab through the remote control.

**Hari Challa:** I can send you pictures, and I can take a block diagram to, I think the senior design team already created some block diagrams. You can refer to that to get a better understanding. I'll send you a physical picture, and then the block diagram should be able to help you how they are connected.

**Doctor Johnson:** The labs the senior design team has created last year had pictures for the devices.

**Hari Challa:** I remember that I have created, doctor Johnson.

**Doctor Johnson:** But as we just as we talked about a little bit before, you're waiting for some of this remote connection stuff to be done as a good time to work on the lab said, doing the network emulation that you can do without waiting for ITS and everything to get the remote access working.

**Yifan Zhu:** We sent you the emails about the remote control so we. So last week we thought we could before the meeting, we could set up a time to do the lab. We haven't started our network emulation.

**Doctor Johnson:** But as i've said more than once, some of the stuff we're getting access to sending up the lab is outside of my control, and many other people that are doing things on their own timeline. And where 1/3 of the way into the semester. Or getting close to 1/3 of the way into the semester. Yes. Before, what about 4, 12 lectures in if it was a Monday, Wednesday, Friday class? I can't make people move. Can't make

people move faster. I can't. We've got the people that are trying to set up the remote access like Hari or Abdallah helping you. This is not the only thing they're doing. So, they're helping with this as they can, but we're running it. Like if they're things that we're running in the lab procedures that require any administrator access on the computer, then we're gonna need to change those for the remote access lab. So as you find things that are stumbling blocks that are challenges, aren't that? Those need to be changed in the lab procedure so that they can be done by the law of students. For example, the IT people may give you a little bit more access for setting up these labs, but the students who actually take the classes where they do the labs, they're not gonna where if they're like 40 students in the class, we're not going to give all 40 of them administrator access on the computer. So, we have to identify anything that's causing problems.

**Yifan Zhu:** So, you want 40 students, all of them, to operate on their own computer?

**Doctor Johnson:** No, 40 is probably an exaggeration, but last time I taught, you see, ECE444/544, I have 36 students. Because of COVID. After the like about halfway through the spring semester, they would have been remote for everything. Normally, the about half of the class would have been on campus and they could have come into the lab and done them that the other half would have been to do them remotely. I've had some masters where i've had 50 outreach students in these classes, and using something like zoom or they could actually we could actually have them in a group doing them out. When I first started trying to do remote labs 20 years ago, there was no way to have more than one person at a time. Trying to do have 40 people do a lab that takes 45 minutes with a lot of time.

**Yifan Zhu:** I see. One more thing. Maybe we can find and download some social software like, what's APP or Facebook, Twitter, or Discord.

**Doctor Johnson:** Are you asking hurry in a dollar who are going to be helping you in the labs?

**Yifan Zhu:** Yeah.

**Abdallah:** Yeah, we have like social talking apps.

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**Yifan Zhu:** Last time, Harry asked me that he failed to create an account on WeChat.

**Hari Challah:** I didn't know if he could have a better way to directly communicate. I tried to create the account and it asked me if I had a friend in China who could invite me. I didn't understand.

**Yifan Zhu:** I see. We can help it.

**Hari Challah:** Just I couldn't register it, asked me if I had an invitation something. Okay, mean, anything would work for me if that helped.

**Yi Ding:** He just EMAIL is okay.

**Yifan Zhu:** Let's move back to the network evaluation. Doctor Johnson, should we so do the network simulation to emulate the lab principles? Like lab 3 or 4.

**Doctor Johnson:** So., I thought you were looking at using that for the labs that were already being done with the ECE444/544, the ones that we're looking at network traffic.

**Yifan Zhu:** That's a little confusion. Our original thinking is to through the TeamViewer to perform the perform the labs, but the network emulation .....

**Doctor Johnson:** So, were you thinking in terms of using it for some of the labs from the senior design team last year? Instead of the ones that is a good impression I got it on your design review was that you were going to use those for the lab, the ones that we're looking at, the different network traffic lab. Sorry, like the one where you didn't have

another source injecting noise where you had an unmanaged switch versus a managed switch. We're looking at the network reconfiguration due to failures and Hari actually helped make the videos for those labs.

**Yifan Zhu:** Doctor Johnson. I think we three need to have some time to discuss about it.

**Doctor Johnson:** Yeah, good. Looking at the labs from last year. I think, as we talked about at your design review lab, the lab 4, the commissioning lab would be a difficult one to do. I'll do it remotely. Lab five of the cyber security one could be done. It's just a little bit tricky. Doing it remotely because some of it is actually trying to set up remote in communications anyway. So, if we look at these are the five labs that the group did last year, the last one was just kind of introduce in the communication with connecting communicate with IED basically, just some very initial set up using accelerator quickset. Lab two, and then also, I think you're doing something to get measurements from the relay. You can see the current measurements. Lab two was and going a little bit further to set up some communication, use a Kocos test set to generate some current measurements. And then you could be able to see those and basically see some basic scale of principles.

And then the next one was using the diagram builder for the archive to build a human machine interface, but just build a display that show the measurements, as I said, this lab four, I'm commissioning a little bit harder, because this is a lot of verifying that the measurements, you're getting are correct, and everything is flipped up correctly. We would probably need to spend a little bit more time figuring out how to make this one work. And then lab five is just setting up this understanding how to set up passwords, how to set up a proxy server and so on. I'm also showing these for Hari and Abdallah. So not the senior design team as it is.

**Hari Challah:** Permit all those devices are connected, doctor Johnson, and so for the Kocos. It's absolutely sitting in the other lab.

**Hari Challah:** The machine lab?

**Doctor Johnson:** I said it's over in gauss Johnson right now.

**Hari Challah:** Connected to the project that.

**Doctor Johnson:** Which project?

**Hari Challah:** Numen' s project the one that the master shouldn't is working on.

**Doctor Johnson:** The generator parameter project,

**Doctor Johnson:** I will talk to him. I don't think he needs it at the moment.

**Hari Challah:** The rest of the devices are already connected. They pretty much need them to access that computer, and they'll be good, too.

**Doctor Johnson:** Yeah, and the desktop computer that they were connecting it remotely has a software for interfacing with this. Because the icon for it was showing on the screen.

**Hari Challah:** So, they can just literally use two of these sessions and of work on the project and give the commands to the Kocos on one of the computers and promoting to the other one to configure the ARTES device and gain the responses from our attack.

**Doctor Johnson:** Yeah, but the thing they can't do is any of the physical connecting things together. So, if things are connected now. Part of it's gonna be when we get to the point where if we're gonna do this as remote labs, are there ways that we can have some of the connections be able to control remotely so that it's not something where the TA is set almost everything up for them. And there's not much left for the students to do.

**Hari Challah:** Sure, doctor Johnson that is very possible. I think we do have the BJT switches, right? I just need a high voltage or whatever the power metric is. I just need the transistors. And i'll be able to set it up. With the connections of the configuration on the go.

**Doctor Johnson:** Yeah, I and also just like something like solid state relay would do it too. Whatever is less expensive and easier to interface, too.

**Hari Challah:** Yes. The transistors are really inexpensive.

**Doctor Johnson:** Yeah, I it's very easy to interface, too. So, we may need to build some interface hardware for this.

**Hari Challah:** According to your configuration, how you would want it to be changeable. It's very easy. I've done that, I mean, throughout the connection easily to transistor design.

**Doctor Johnson:** But in the meantime, if I'd like to get to the point where the software is working, so that the senior design team can, at least interact with the and talk to the software. So, the accelerator quickset the accelerator, HMI, and so on. And the Kocos software so that they can see what the pitfalls are, and see how well it works running it remotely, see what the challenges are so that we can figure out. So they can figure out what works and what doesn't work and what needs to be fixed.

**Hari Challah:** That sounds good, doctor Johnson. Yeah, only the Kocos would be a bit of a Challenge because of the physical connections involved. Best of it, would not be that much of hassle. And other problem, we would have it with the network security gateway, with the fiber input. We do not have a converter.

**Doctor Johnson:** You're right. We probably don't have an option on that.

**Hari Challah:** Sure. If you want to add more labs, we can also add the satellite synchronized clock in the SDN comparison with the normal switch, the labs, we had a parallel redundancy path, and one that John created. I think they can easily be upgraded ,doctor Johnson. Since once we figure this out like how to do this session of the remote and the initial of a few of the sessions. I think it would be the same thing for the rest of the other ones. And other students can do the same.

**Doctor Johnson:** Okay, if you work with them, I don't want to have too much project creep where they add things. So, if it's something where there's another way to upgrade the labs that you and John worked on before. I mean, technology has certainly changed since those labs were created.

**Hari Challa:** I think people will enjoy the SDN configuration.

**Doctor Johnson:** I am not sure if 'enjoy' is the right word.

**Hari Challa:** You're right. Actually, enjoy learning it, but not really using it every day. That's what I mean. I meant to say it doesn't have a lot of configuration, but it doesn't like allow people to really understand like the paths and the flow and how data is configured. They've got like very interesting characteristics of normal switch and SDN.

**Doctor Johnson:** They don't know what SDN is.

**Hari Challa:** You are right, doctor Johnson. I'm sorry.

**Doctor Johnson:** SDN is short for software to find network switch. Represents a little bit different philosophy for switches. If you have a network switch, basically, by default, it's assuming that everybody is trustworthy, and everybody can talk to everybody. And the first lab that it was in the EC 544 labs was basically saying that we've got an unmanned that we have AA basic switch that will allow anything. Then the next thing was all, let's put it a little bit more management and it's been on this and say that we're only in a while packets that look legitimate go through. We're only in a lot of packets that are and sort of pre-defined subset of legal IP addresses and so on. The software to find networks which kind of start out. From the point of view, everything is off. And you enable only the things you want to allow, which makes it a lot harder to kind of to work with. Once you get it working, it enhances security significantly. I'm not sure that would be an appropriate one to add for this team to work with. I think they have their hands full already just trying to do this remotely. And with all the bottle next, we've had so far to get in the remote access working.



**Hari Challa:** You're right, doctor Johnson, I was just adding it on. It's some extra thing they could take on if I've been there done, but it's just for like future teams who would want to like go over it because I've walked on like creating the network and so much configuration. And I think it's very useful like if I can put this along with this lab because I think it's beneficial for students to know, because it's the coming future. People are going to see a lot of SDN out there. I don't think it would take very long for me to like really set it up. We have all the resources we need. I mean it's just a remote that they have to figure it out. Once they get that secure system set up, will all be good to go?

**Doctor Johnson:** If we can get to the part where the road access working and they can get into that. Right now, that's the priority. Yifan, if you identify software that we need to install on this computer, let us know quickly. You were talking about team viewer, for example, is one of the things that you wanted to be able to put on, right?

**Yifan Zhu:** Yes.

**Hari Challa:** If you put on TeamViewer, you're it would be something to have an unintended access set up, right? It's kind of makes it a difficult question because someone has tried an account and it's kind of like makes it messy. I think like there is another alternative we can use called Any Desk and that should work better. I mean, all that needs is someone don't really set up. It doesn't need an account of a credential that has to be connected in between your cloud.

**Doctor Johnson:** As long as it's something that will need the constraints for the university IT people, too.

**Hari Challa:** Yeah, this is better. It has a fight, but it is encryption. It's like ridiculous military, I think.

**Doctor Johnson:** Because my original idea was that this that the people doing this lab would be in a separate VPN group so that we would also be

able to limit the number of people does just the team right now or the team and you are in with Abdallah. And then later, the people and the students taking the class. Team viewer also has just got a bad reputation, because I think that was one of the things that was. There was a water, water treatment facility in Florida that was broken into by some people that I think were more obvious type hackers. That you're saying we can change the mix of the chemicals used to treat the water like...

**Hari Challa:** It's like the people who wanted to change the things in the space. You know, the 1980s and started moving things in the space from a computer terminal. Any desk is very easy, doctor Johnson, and we can limit the discovery to local devices and they can just connect with the local devices or we can set up a password only they can have. They can have the ID which allows them to connect to it. I don't think the ideas would have an issue because the VPN would allow anywhere.

**Doctor Johnson:** I mean, right now, I think they're just coming in for the standard UI VPN. I'm not certain of that, but it's looks like that's what they did. You're just coming in through VPN that belongs to UIDAH0 VPN, aren't you?

**Yifan Zhu:** Yes.

**Doctor Johnson:** Yeah, so that's the standard university VPN group.

**Hari Challah:** I'm not sure if they can really access to you, doctor Johnson. Mean that computer does seem to have internet connection but, would they allow it to be connected to the computer down there, with the devices?

**Doctor Johnson:** That's probably the reason I wanna find out what software they want. And we need to get that clear to get it installed.

**Hari Challah:** Because it would bridge it to the internet and I am not sure like our security policy about that.

**Doctor Johnson:** I mean, if you're bridging to that window seven computer, that might be more of a worry. Yes.

**Hari Challah:** Think that's the one that's got all the software. I don't know how Ray would want to set it up. I may have to discuss this with him further.

**Doctor Johnson:** Yes.

**Hari Challah:** Get some approval and some insight on how he would want it. How do you do that?

**Doctor Johnson:** He may have some other ideas.

**Hari Challah:** That sounds good. I will set up a meeting with him and discuss that.

**Doctor Johnson:** Okay. And we may want him to talk for being a part of the next week's meeting for this team.

**Hari Challah:** Sounds good.

**Yifan Zhu:** I think we are finished; all I want to ask. Please, let us in the next 2 days. We three and Hari. So, we can have a deep discussion about the remote-control problems. I think that's all for today. So, thank you for your attending. So, have a good day.

**Doctor Johnson:** Doctor Li, do you have anything?

**Doctor Li:** No, I don't have anything. Do you think like 24<sup>th</sup>, still good for your design review?

**Doctor Johnson:** If we get the remote access working, it should be.

**Doctor Li:** Thank you. Yeah, so far. You mentioned you want something like WeChat. If you really need, I know to. Because Trump wants to ban

WeChat in US, so the Chinese figure out the two options. The first one is Line; it works for US and also in China. Another one is telegram.

**Yifan Zhu:** Telegram?

**Doctor Li:** Yeah, Telegram and Line work both work in China, maybe you can use them to connect to Hari.

**Hari Challah:** It sounds good, doctor Li.

**Doctor Li:** Okay, see you next week.

**Yifan Zhu:** See you. Thank you for your time.

**Doctor Li:** Thank you.